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ABSTRACT

Los Alamos National Laboratory (LANL) developed a model for school networking using Los Alamos Middle School as a testbed. The project was a collaborative effort between the school and the laboratory. The school secured administrative funding for hardware and software; and LANL provided the network architecture, installation, consulting, and training. The model is characterized by a computer classroom linked with two GatorBoxes and a UNIX-based workstation server. Six additional computers have been networked from a teacher learning center and the library. The model support infrastructure includes: local school system administrators/lead teachers, introductory and intermediate hands-on teacher training, teacher incentives for involvement and use, opportunities for student training and use, and ongoing LANL consulting. This overview of the project provides background information; a description of the model which identifies its goals, success factors, and characteristics, including technical design, coordinated school approach, user support, and monitoring and evaluation; the design and implementation of the project; and teacher and student training and overall use of the program. Formative evaluation data are cited as revealing that students and teachers alike are finding the Internet to be a tool that crosses disciplines, allowing them to obtain more timely information and to communicate with others more effectively and efficiently. (Contains 3 references.) (Author/JLB)

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Using the Internet in Middle Schools: A Model for Success

A Collaborative Effort Between Los Alamos National Laboratory (LANL) and Los Alamos Middle School (LAMS)

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Submitted to the Association for the Development of Computer-Based Instructional Systems (ADCIS) and the Association for Educational Communications (AECT) Joint Conference, Nashville, Tennessee, February 16–20, 1994

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A Collaborative Effort Between Los Alamos National Laboratory (LANL) and Los Alamos Middle School (LAMS)

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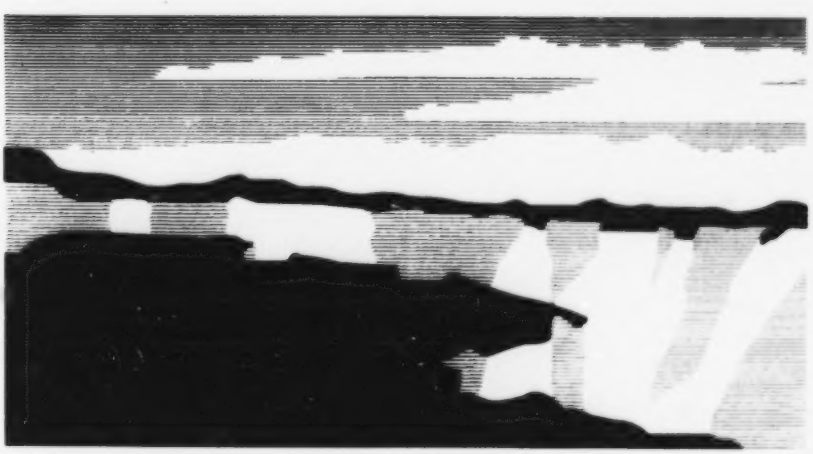

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ABSTRACT Los Alamos National Laboratory (LANL) developed a model for school networking using Los Alamos Middle School as a testbed. The project was a collaborative effort between the school and the Laboratory. The school secured administrative funding for hardware and software; and LANL provided the network architecture, installation, consulting, and training. The model is characterized by a computer classroom linked with two GatorBoxes and a UNIX-based workstation server. Six additional computers have also been networked from a teacher learning center and the library. The model support infrastructure includes: local school system administrators/lead teachers, introductory and intermediate hands-on teacher training, teacher incentives for involvement and use, opportunities for student training and use, and ongoing LANL consulting. Formative evaluation data reveals that students and teachers alike are finding the Internet to be a tool that crosses disciplines, allowing them to obtain more timely information and to communicate with others more effectively and efficiently. A lead teacher's enthusiastic comments indicate some of the value gained: "We have just scratched the surface. Each day someone seems to find something new and interesting on the Internet. The possibilities seem endless."

I. PROJECT BACKGROUND

Motivation

The world of computer networking is opening doors to vast and wonderful classroom resources. Networking technology has advanced rapidly, and networking in the schools has been and, it appears, will continue to be implemented at an increasing rate. Five years ago, little potential existed for using internetworking in schools. Now, in 1994, the advantages of using networking technology in education are readily apparent. Libraries, universities,

national laboratories, corporations, companies, and classroom teachers are sharing or making information and resources available through computer networks. The potential for our students is limited only by imagination. As Newman (1993) stated, "computer networks hold the key to the large-scale implementation of school technology."

A national goal is to have every public school connected to a national information highway by the year 2000. Is the nation prepared to network all public K-12 institutions in the United States within the next six years? To meet this national goal, we must know what is working and what is not working about hardware, networks, software, curriculum integration, structuring issues, maintenance, and support. We must document the lessons learned to avoid reinventing the wheel and to leverage federal and state money effectively.

History

In early 1993, Los Alamos Middle School (LAMS) used an existing Apple Macintosh-based computer lab with a local area network (LAN) to begin a new technological effort. Mr. Trottier, the LAMS principal, discussed with Los Alamos National Laboratory (LANL) the possibilities of designing a new network and obtaining help with connection to the Internet.

In 1993, LANL staff assisted LAMS teachers in this effort. The Los Alamos School District additionally supported this project by providing the funding to purchase equipment and software.

Many schools are becoming "connected," however, being able to use that connectivity effectively is difficult for classroom teachers. Connie Stout of T-Net, a Texas networking effort, summed it up very well when she said: "Fear of the technology, inadequate funding and support, lack of adequate reasons to use the network, lack of access to telephone lines, and lack of time in the day are just a few of the hurdles that must be overcome before these networks will be used by PreK-12 educators." (Apple Classroom of Tomorrow Project).

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There is a clear need not only to make networking technology and information available to the schools but also to provide training, software tools, and interfaces to make that technology and information readily and easily usable by our educators. LANL staff and LAMS teachers in this effort all agreed that the technology installation was just one part of the integrated educational technology picture. Instruction about available resources, how to access them, and how to use them easily and effectively is as important. Backed by the principal and supported by the lead teachers, we decided that training sessions should be developed to provide instruction for *all* the teachers and staff at the middle school in the use of the new technologies and the Internet. LANL staff members designed two instructional sessions (delivered multiple times), provide consulting support, and are planning additional training sessions. The LAMS lab directors/lead teachers are also designing and teaching additional sessions and providing lab time and assistance for the teachers. The results have been very rewarding, and feedback from the teachers has been very positive.

We want to share what we have learned from the middle school project with other schools and people interested in school networking, connecting to the Internet, or using Internet connectivity to a better advantage.

II. A MODEL FOR SCHOOL NETWORKING

Goals

A goal has been set by the federal government for all schools to be connected to a national network within the next six years. Yet, there are very few documented, feasible, and validated models of school networking for administrators and planners to follow. The goal of this project was to establish such a model, building upon both school resources and national resources in a partnership arrangement. Primary goals were to

- explore how we can connect the schools to the Internet in a scalable manner;
- document the model for use by other schools; and
- use the middle school as an educational networking testbed to determine
  - factors involved in connecting a school;
  - ways to help students, teachers and administrators use the resources effectively;
  - ways to train teachers to be system managers; and
  - steps for helping connected schools to become self-sufficient.

Success Factors

Major keys to the project's success were as follows:

- Significant, dedicated, continuous administrative support (*the principal*)
- Dedicated, qualified school computing staff that supported networking (*lab teachers*)
- Adequate, state-of-the-art hardware and software provided by the school system
- Facilities dedicated and supported for computer networking (*existing lab*)
- Technical support for start-up, network design, and training *(LANL staff)*

Characteristics

Figure 1 is a schematic of the LAMS model networking project. Distinguishing characteristics of this model include the following categorized features.

Technical Design:

- Central computer lab, with additional satellite workstations throughout the school
- Central, UNIX-based server accessed only by the school's system administrators
- Liberal use of public domain software
- Security plan

Strong, Coordinated School Approach

- Ongoing support by the school administration
- Dedicated and qualified school staff supporting computing and networking
- A financial plan and proposals for hardware and software acquisition
- Collaboration with parents knowledgeable in the relevant technologies
- Request for state-of-the-art hardware and network architecture
- Incentives for teachers to learn about and use computer networking resources

User Support

- Training program for lead teachers
- Training workshops for all school teaching and administrative staff
- Computer lab scheduling to allow usage opportunities for students and teachers
- Consulting support

Monitoring and Evaluation

- LANL monitored the effectiveness of the teacher training sessions and the school's overall use of the Internet. The evaluation took the form of direct observation, interviews with students and teachers, examination of curricular applications and output (projects that used Internet information), and questionnaires.

III. DESIGN AND IMPLEMENTATION

Equipment And Connectivity

The LAMS computing environment is comprised primarily of Apple Macintosh (Mac) computers connected by an Apple LocalTalk network to several printers. Several models of the Macintosh exist within the LAMS environment, ranging from Classics to a Centris 610 with the most common model being the LCIII. We found that the tool, InterPoll, from Apple worked well to survey machine types, system versions, and printer software versions.

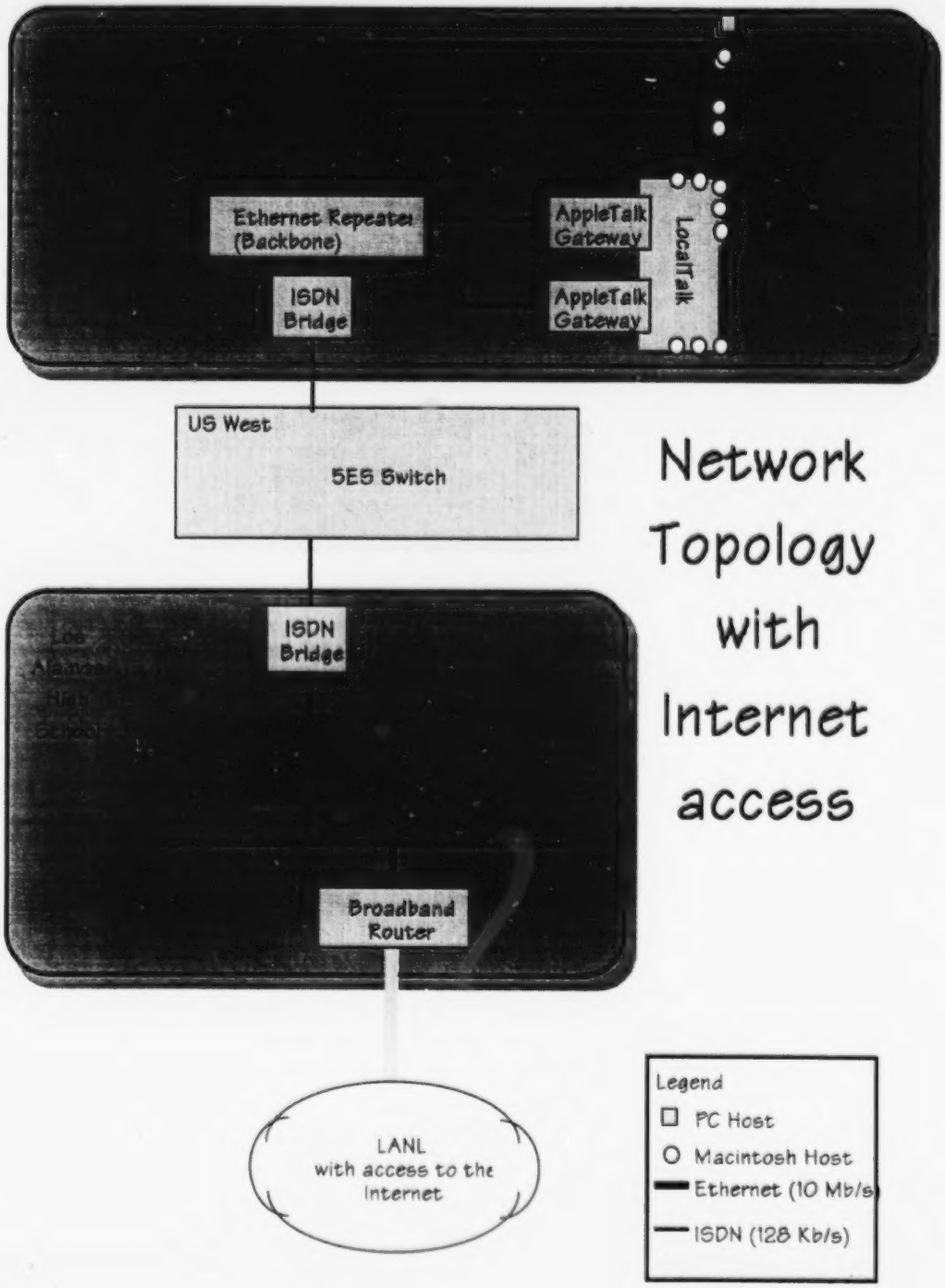

Figure 1. Middle school network topology with Internet access.

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The main computer lab was divided into two networks because there were too many systems to be connected on a single LocalTalk network. Each network has a GatorBox that acts as a gateway for a PhoneNet link to the Ethernet. All systems were upgraded with MacTCP (version 2.0.2) to insure that system software would work with MacTCP (Macintosh Transmission Control Protocol).

Configuration of each Macintosh was tedious but straight forward. Each system needed a unique system name, a default user name, and an IP (International Protocol) address. Specific parameters, such as the gateway and name server addresses for MacTCP, were set on a default version that was loaded on each system. Therefore, only those parameters unique to each system had to be entered manually.

In this particular situation, the local high school was already connected to the Internet; so we needed only to provide a connection from the middle school to the high school. This connection, a basic rate Integrated Service Data Network (ISDN) line, was provided by US WEST, the local phone carrier. LANL staff specified the ISDN line, hooked up the line to both LANs at the two schools, and performed troubleshooting of the ISDN line and the connections. The middle school ordered the ISDN line from US WEST and specified where the line was to be installed.

Software

An essential step was to determine the requisite software for the server and find software to support the goals of the project for the Macintosh clients. Most of the required software was freely available over the Internet. The project initially required software that would access Gopher servers, World Wide Web (WWW) servers, network news servers and also facilitate electronic mail (e-mail) connectivity. Some support software was also needed.

The next step was to install the requisite software on the server. Software servers set up on the UNIX-based workstation included: POP (Post Office Protocol); DNS (Domain Name Service); Gopher, enhanced anonymous FTP (File Transfer Protocol) service; and WWW.

Public domain and commercial software packages were selected, obtained, and installed. Public domain software obtained over the Internet to meet project goals included: TurboGopher, NCSA Mac Mosaic, NewsWatcher, and Eudora (with support utilities StuffIt Expander, JPEGview, Sparkle, Ulaw, UlawPlay, SimplePlayer, Image, DownLine, and NCSA/BYU Telnet).

Commercial packages purchased by the school were also installed and included: Apple MacTCP, Apple Quicktime, and VersaTerm Network Utilities

Other public domain software packages loaded for specific projects included: BinHex 4.0, Compact Pro, Digital Camera, InterNews, InterPoll, GradeBook, Kolor 2.0, MacWAIS, MoviePlayer, SndPlayer, Talk-2-me, Tidy it up, Ultra Recorder, and MacTCP Ping.

Issues and Problems

Equipment: The use of a UNIX-based server can be seen as both a strength and a weakness of this model. The strength is that it enables us to easily provide network services such as DNS, POP, and other servers using public domain software. The weakness is that UNIX and its administration are nontrivial to learn; therefore, nearby experts who are willing to assist on an ongoing basis at the beginning of the effort are essential. The robustness of the UNIX server and the proximity of experts at LANL made this a cost-effective testbed approach. As the technologies improve and the number of UNIX experts increases, this weakness will probably disappear.

The Macintosh is designed to be a "personal" computer; it assumes that only one person will be using the system. Specifying a "user name" presented a problem because these systems were in a computer lab and would be used by many students and staff members. Therefore, we adopted the approach of specifying a generic user for each system; for example, a system named "Mac-12" had a corresponding user name of "User-Mac-12." For most of the applications, having a generic user name presented no problem. However, for e-mail, this created a major hurdle to overcome. Luckily the solution was simple. The e-mail software was not installed on any of the systems in the computer lab. Each user was given a diskette that contained Eudora, the e-mail utility, and a unique settings file that identified them as the user. With the diskette, users could retrieve and archive mail, and they could move freely between systems while preserving the privacy of their e-mail.

Software: Particular attention was paid to software versions. This was especially true of system software such as MacTCP. We were careful to use the latest version of software and ensure that it was compatible with the operating system on each Macintosh. Most systems were running version 7.1 of the MacOS; however, a few older machines were running earlier versions.

Furthermore, keeping the software base current with the latest release of each application is not trivial It is important that the systems users have a consistent software environment. New software must be introduced carefully to lessen the impact on these mostly novice users. We have yet to work out a standard procedure for the introduction of software upgrades.

System Clocks: Once systems are connected to one another in a LAN, synchronizing their internal clocks is important. As you move software from system to system in the network, having an accurate time associated with files is important so that you know which file is the newer version. We used VersaTerm Time Client as a utility to deal with this problem; it updates the system clocks across the network from a network time server.

Communications Lines: We had major problems getting the ISDN line installed correctly. Most of the problems were delays; it took a long time to get the line installed. Once the line was installed, many phone calls were necessary to troubleshoot the line and the local carrier's switching equipment.

IV. TEACHER TRAINING AND INTERNET USE

Lead Teacher Training and Support

When it became apparent that the installation of the Internet connection and LAN was imminent, two lead teachers were trained as the system administrators. These lead teachers were to get a head start in learning how to access and effectively use Internet software and information. The lead teachers served as system administrators, learning to use UNIX on the server, and as Lab assistants during initial teacher training hands-on workshops. Now they are Internet teachers for classes of students and also provide individualized instruction and consulting for teachers, students, and staff.

Teaching and Administrative Staff Training Sessions

Two teacher training sessions were designed and held for *all* LAMS teachers and administration staff. In the first session, teachers learned to access information through Mosaic and Gopher servers and get net news using NewsWatcher. In the second session, they learned about e-mail using Eudora. In these sessions, the staff worked in pairs for one-hour periods listening to descriptions of tools and capabilities and then using the tools hands-on in the lab.

Evaluation results revealed that most of the teachers agreed that they wanted to learn more about computer networking and thought the resources, especially Gopher and Mosaic, were incredible. In the first session, teachers began to see the value of the network to their curricula; but they truly comprehended the Internet's (power, importance, significance) by the second session. Teachers stated that networking was valuable in their classrooms, lesson

planning, and curricula in the following ways: doing research, sharing information with other schools across the nation and world, locating statistical data for debates and persuasive speeches, corresponding by e-mail , problem sharing/solving, finding interests of students, and locating career information/suggestions. Teacher's comments about the potential benefits of computer networking included: excellent research tool, expanding the walls of the media center, more resources, more options, limitless, too many to list, new method of instruction, and more efficient use of time.

Teacher Use of the Network

Teachers continue to use e-mail and the Internet for research and to share ideas. For specific research topics, teachers have searched the Internet by keyword. One social science teacher used 1990 census comparative data to gain current, accurate, information about Los Alamos for a student video project. Social science classes studying New Mexico have used the National Weather information and satellite images for ongoing reports on New Mexico weather. Another teacher asked for lessons or information on civil rights and/or prejudice to use in conjunction with a unit on Dr. Martin Luther King. He was amazed by the variety and excellence of the lesson plans that he found on the Internet. These are only a few examples; the list grows daily. It is very encouraging to teachers to be able to find something and say, "This is exactly what I need!"

The teachers also use the network to get the "latest breaking news" on topics for use in their classrooms. For example, the day after the recent earthquake in Los Angeles, a teacher used the Internet to get the latest breaking news as well as general information about earthquakes to use with classes that day.

Important Note: These are primarily novice users. The initial teachers' workshops were held only three months before the writing of this paper.

V. STUDENT TRAINING AND INTERNET USE

Shortly after the first teacher training workshop, a group of 15 students from the 8th grade Gifted and Talented Education Program (GATE) was introduced to the network. Each student was given an e-mail address, password, and a Eudora disk. The lead teachers then taught the students how to send e-mail. They began by sending mail to each other and then to friends, teachers, and family members, as well as to peers outside the school network. After the initial session, students were invited to use the computers during open periods, and they took full advantage of this invitation. During sessions, it was not unusual to hear a student exclaim, "Hey, I got a message from my dad!" or "I have to leave a message for my mom to tell her that I'm going to Susie's house after school."

News at the school travels about as fast as e-mail on the Internet; so right after our first session with students, we had about ten students approach the lead teachers for e-mail addresses and access to the Internet. The lead teachers decided to hold another training session for the original 15 GATE students to introduce them to Gopher and Mosaic before starting

with another group. In that session, the students quickly found shareware software, census information, and satellite images using Gopher. They also discovered Dr. Fun and museum resources with Mosaic.

Several new introductory sessions have now been held for other groups of students. Students can sign up for an Internet class and get addresses during a "stretch period" (two-hour periods, offered once a week, when students can choose special activities). The first to sign up get in—the sign-up list for the "Internet Stretch" is always full!

We also discovered Listserv information and suspected it would be of interest to the students; we were right—they took off. One particularly valuable Listserv was KIDLINK. This links kids, ages 10 to 15, through e-mail to other kids around the world. By this time, more students had asked for access to the Internet and e-mail addresses. We have students sign an agreement about proper use of e-mail along with their application for an e-mail account.

We have received mail from kids in many countries including Norway, Germany, and Russia. As David Hollman, a member of the first Global Classroom Youth Congress stated, "There's no way I could have opened a textbook and gotten the same information I obtained from online dialogue with peers in Israel, Russia and China." (Itzkan, 1994).

After approximately three months 69 students have attended e-mail/Internet classes and are using e-mail and Internet resources—with classes and individually. In addition to these voluntary sessions, classroom teachers, assisted by the lead teachers, bring entire classes to the computer lab to use the Internet for specific purposes and activities.

VI. TECHNICAL AND CONSULTING SUPPORT

LANL staff provided technical guidance and support for hardware connectivity, network growth, and installation and use of network/user software. They helped the middle school staff network their computing facility to the outside world with Internet and e-mail, and now they continue to provide consulting support. When a problem was unrelated to the network connection itself, e-mail emerged as the most effective method of consulting.

VII. SUMMARY

Clearly, this model of school networking is a stage in an evolutionary process. Lessons learned are numerous and, as shown in the problems section above, the installation of the network in an educational setting with a pre-existing computer lab had both advantages and disadvantages. However, now that everything is up and running, we find that keeping up with the usage and application needs of motivated teachers and students is the primary challenge.

As this paper goes to press, the model illustrated here is being used to design an educational networking system in another school district. Lessons learned here, especially the keys to success, are being directly applied to this new project. The model will be refined as new testbeds yield new insights and information.

Installation of the technology, however, is just the first step in experiencing the Internet in an educational setting. As collaborative learning becomes a major form of instruction, new and yet unknown Internet learning experiences will occur; thus new educational uses for the Internet will emerge. We therefore see our next step to be continued evaluation and refinement of this model as we wait, watch, document, and continue to learn.

REFERENCES

Apple Classroom of Tomorrow Project, ACOT, Apple Computer, Cupertino, California.

Itzkan, Seth J. (1994). Student Recommendations for Global Networking in Schools. *Technical Horizons in Education Journal*, volume 21 (number 6), 61.

Newman, D. (1993). School Networks; Delivery or Access. *Communications of the ACM*: 36(5), 49-51.

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